

Expert System to Diagnose the Level of Learning Stress in High School Students Using the Forward Chaining Method

Cut Rizki Putri Amalia *

Information Technology Faculty, STMIK Abulyatama
Email: cutrizkiputriamalian@gmail.com

Received: 18 December 2020; Accepted: 22 March 2021; Published: 13 April 2021

Abstract: The research objective is to design an expert system to diagnose the stress level of learning in high school students using the web-based Forward Chaining method. It is hoped that it can be used as an initial alternative to determine the level of stress experienced by students in learning. The research method fully uses a system development model consisting of the need for stages, making prototypes, evaluation stages, and system maintenance. The results of this study succeeded in making an expert system design to diagnose the stress level of learning in high school students using the Forward Chaining method and analyzing the results of the IF THEN ELSE calculations using Forward Chaining.

Index Terms: Expert System; Diagnose; Learning Stress; High School Students; Forward Chaining.

1. Introduction

The use of an expert system can be the right solution in handling hysterical personality disorder [1]. An expert system is a computer-based system that uses knowledge, facts, and reasoning techniques in solving problems that usually can only be solved by an expert in a certain field [2,3]. Expert systems are designed to be able to do reasoning like an expert in a particular area of expertise [4]. The purpose of developing expert systems is not actually to replace the role of humans [5] but to substitute human knowledge into a system so that it can be used by many people. The use of computers can provide solutions to problems such as intelligent systems which are very useful for internal and external users. Intelligent systems or artificial intelligence (Artificial Intelligence) can be defined as intelligence shown by entities. One of the branches of artificial intelligence is expert systems [6].

An expert system is a computer system that tries to provide advice to imitate the reasoning process and knowledge of an expert in solving a problem [7]. With this expert system, ordinary people can solve problems or just look for quality information that will be considered successful when they are able to make decisions as was done by the original experts both in terms of the decision-making process and the results of the decisions that will be obtained.

Based on the results of observations made on counseling guidance teachers in several high schools in the city of Banda Aceh, information was obtained that, stress symptoms that are often experienced by students include environmental factors, friends, mood, and family factors [8, 9]. Several previous studies on the diagnosis of stress levels of learning in students have been successfully carried out by several previous researchers. Expert System To Analyze The Level Of Learning Stress In High School Students. It has the result that students are afraid of learning because they have answered the wrong question and feel humiliated by the teacher so they feel afraid in learning. Expert System for Measuring Stress Levels in students with the Forward Chaining Method resulted in the stress level of learning students the main factors were student fatigue, and unstable emotions [10, 11]. From the results of this study, it can be seen that the stress level of learning in students is due to factors of friends, environment, and family that make students stressed in learning. The stress that occurs can be in the form of positive or negative stress, where the stress will have its own impact on the person experiencing the stress. Basically, stress occurs because the mind is too heavy, and there is the pressure that causes a lack of concentration.

In this research, the writer wants to create an expert system using Forward Chaining. Forward Chaining can be said to be an inference strategy that starts from a number of known facts. The search is carried out using rules whose premise matches the known facts to obtain new facts and continue the process until the goal is achieved or until there are no more rules whose premise matches both the known facts and the facts obtained.

Forward chaining is also called forward chaining or data-driven search. So the search starts from the premises or input information (if) first then leads to conclusions or derived information (later). Forward Chaining means using the set of action-condition rules. In this method, data is used to determine which rules will be executed or by adding data to the working memory for the process to find a result [3,4]. Forward chaining is also called bottom-up reasoning because

reasoning from evidence (facts) at the lower level leads to conclusions at the upper level based on facts. The bottom-up punishments in an expert system can be likened to conventional bottom-up programming. The accuracy rate based on facts on forward chaining is 95% [2,3].

2. Research Method

The stages carried out in this study are as shown in Figure 1 below.

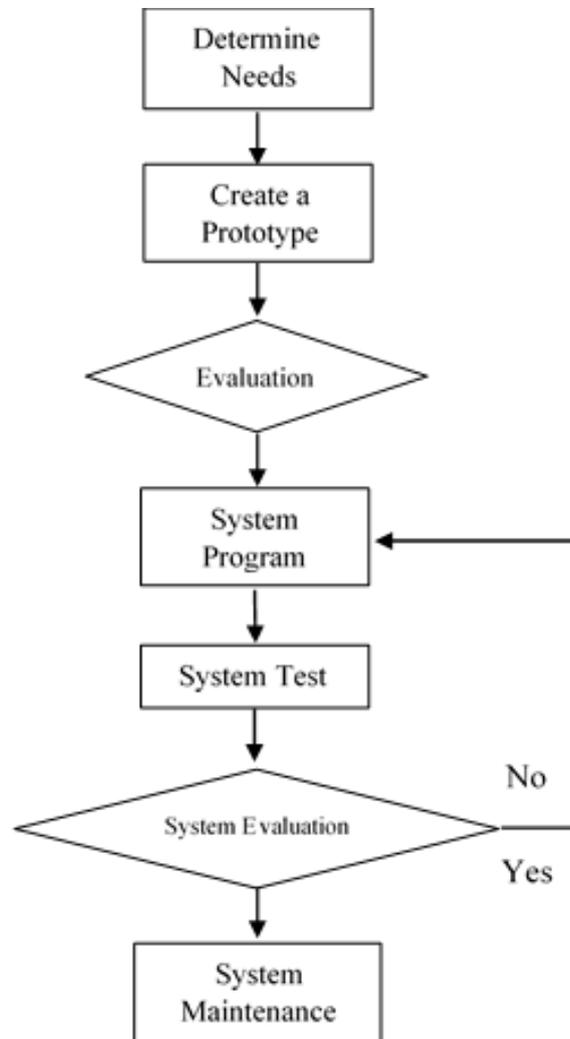


Fig.1. Research Flowchart

From the picture above it can be explained that the flow of the research flow diagram is as follows; Determine the needs of this stage is usually used to determine what needs must be in research so that the system can run as desired. Then make a prototype after finishing determining the required requirements, then create a research flow using the prototype method. What is built in accordance with what is desired? Entering the evaluation stage aims to see the deficiencies that exist in the design of the system to be made and if there is something that is not in accordance with the needs it will be changed according to the criteria of need Then the stages of this system program change the design that has been designed into a programming language. After completing the system test, in this stage, the finished software will be tested by the system first before being used later by the user. Whether the software is ready for use or not and then enter the system evaluation stage which aims to see to what extent there are deficiencies in the software that has been made, if all is successful then use a system that is ready to use. All of the above data were obtained by searching for literature study journals, direct interviews with counseling guidance teachers at one school, and using a questionnaire where the questionnaire would be given to high school students. The questionnaire was filled in as a form so that the counseling guidance teacher knew the extent of learning stress. in students. System design is a stage for describing a new model or being developed by the author himself. For the design of this research system with a depiction of system modeling, namely using structured methods in the form of a Context Diagram, DAD (Data Flow Diagram), and a Data Dictionary.

3. Result and Discussion

Expert System Design to Diagnose the Level of Learning Stress in High School Students Using the Website-Based Forward Chaining Method that the author designed consists of several stages, namely input design, output design, process design, control design, workforce design, and cost design. The writer hopes that this design will make it easier for each user, especially the Academic Section of Senior High School (SMA). This input design consists of several program files, namely; Officer Data Entry Program, Student Data Entry Program, Diagnostic Data Entry Program, Symptom Data Entry Program, Knowledge Data Entry Program (rule), and Consultation Data Entry Program.

The use of expert system design to diagnose the stress level of learning in high school students using the Website-Based Forward Chaining Method, seen from the design of the application in the form of an application display. The login form is used as system security from abuse of access rights, so that data security can be guaranteed. Here the user is asked to enter a user name and password to be able to access further data. For more details, the login process can be seen in the image below.

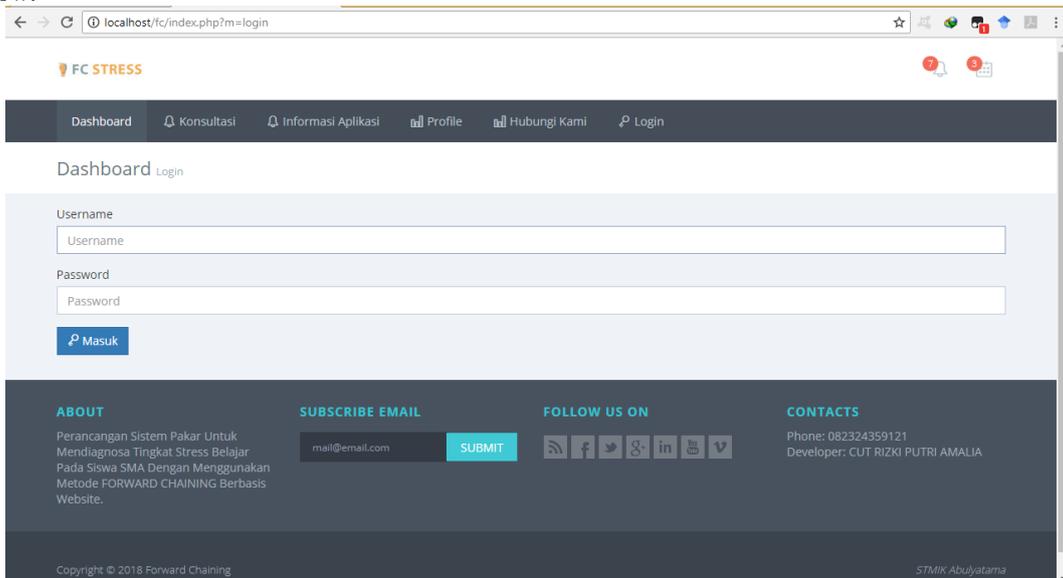


Fig.2. Login Form Display

In the form below is the main menu form which contains the master display of diagnosis, symptoms, knowledge, password, logout, and user. Computer users just need to click the desired menu icon to see what is in the file.

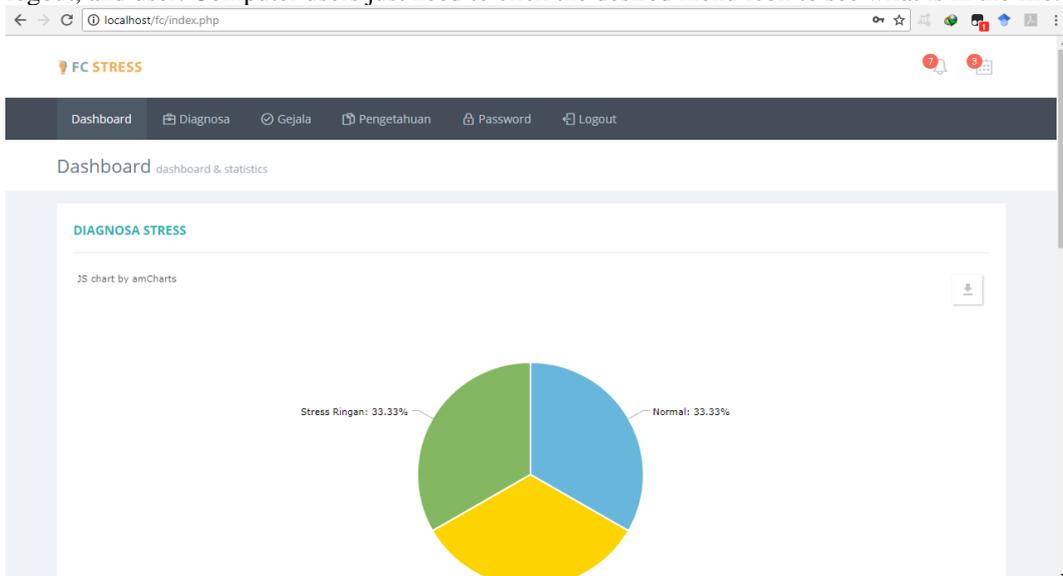


Fig.3. Main Menu Display

The diagnostic input menu is a page where the user can input diagnostic data, in this case the criteria as an effect of stress levels. Where in it contains codes and diagnoses.

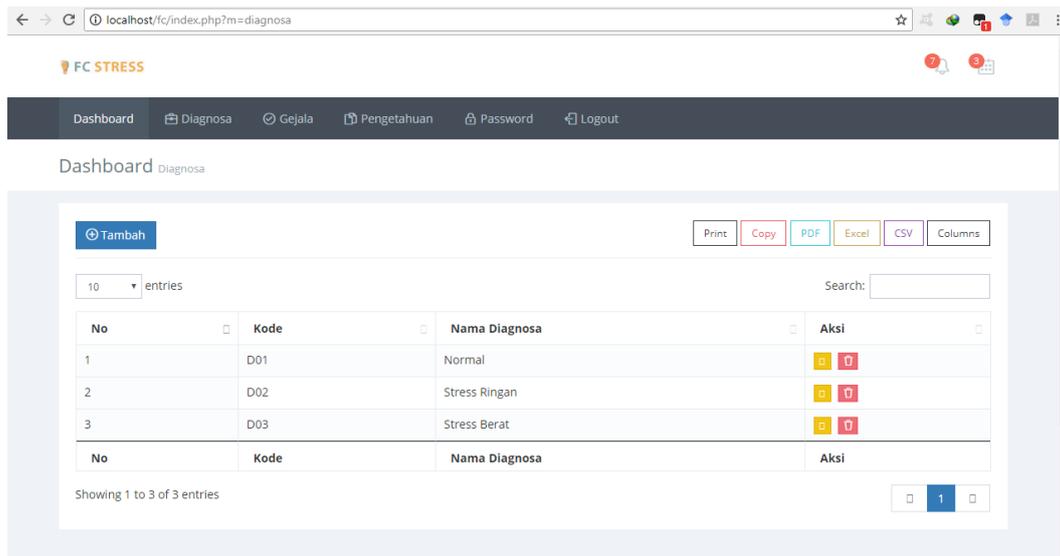


Fig.4. Diagnostic Input

The symptom input menu is a page where the user can input symptom data. Where in it contains the symptom code, and symptoms.

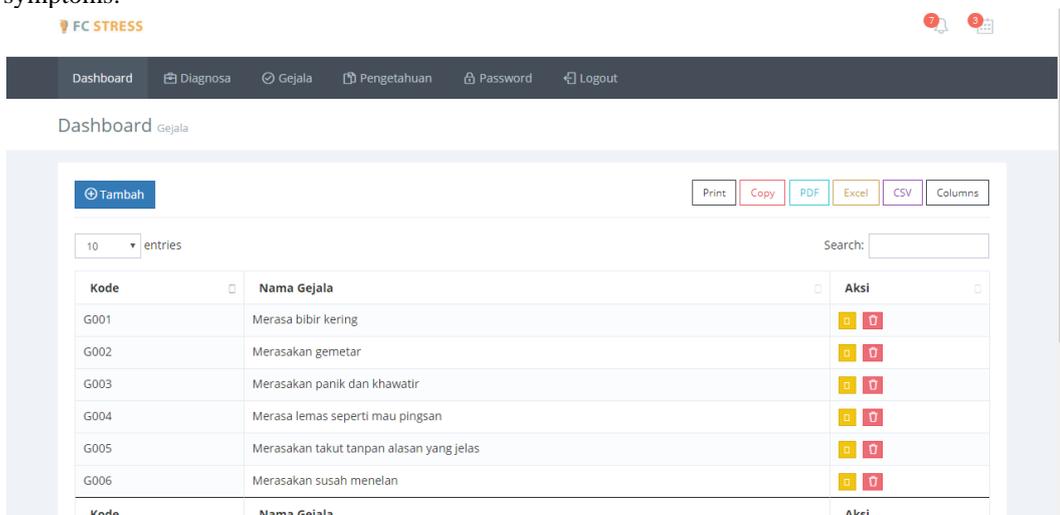


Fig.5. System Input

The symptom input menu is a page where the user can input the intended knowledge for setting rules for symptom conditions and stress diagnoses. Where in it contains the IF and THEN from the question.

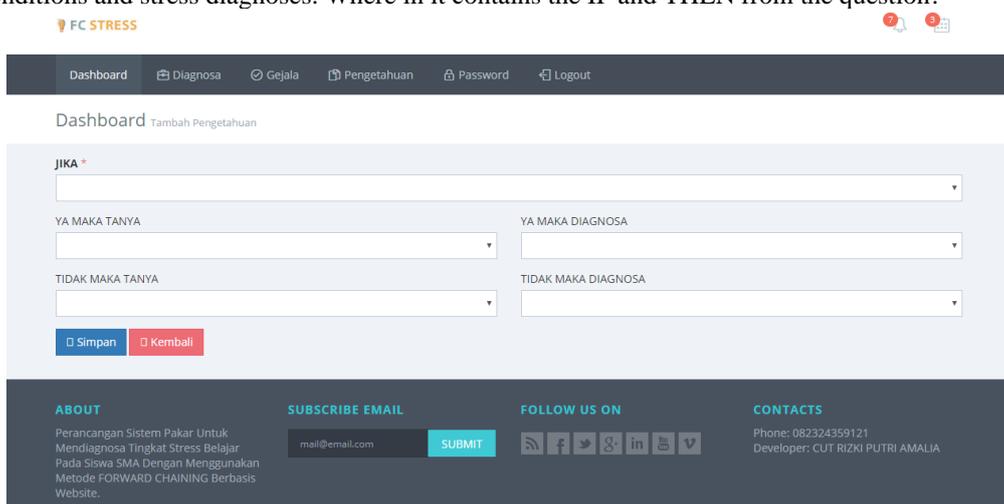


Fig.6. Input rule knowledge

The password input menu is a page where the user can change the system user password data as an effort to secure access in the application.

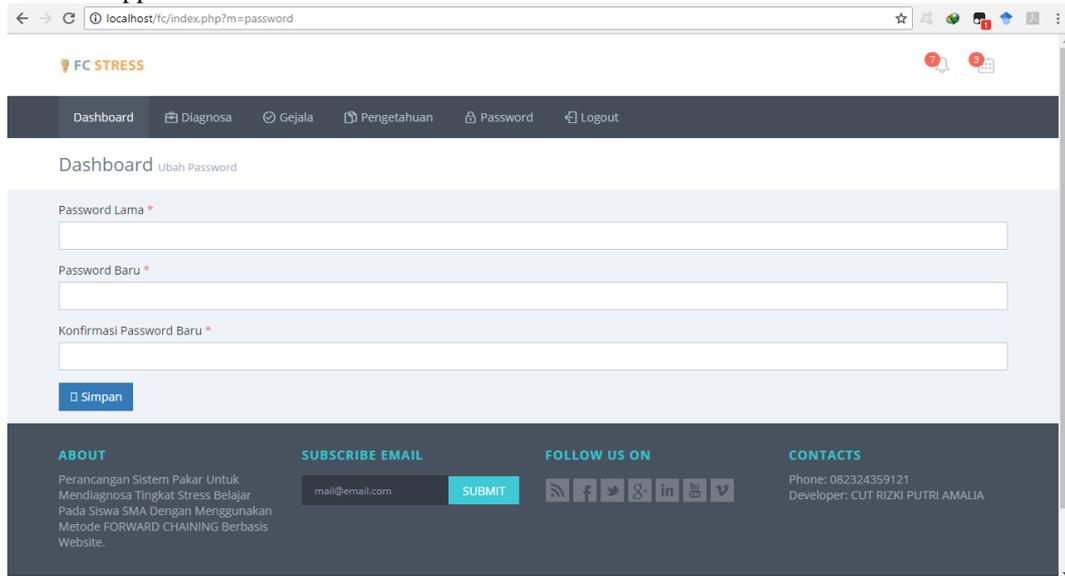


Fig.7. User / Admin Input

The diagnostic data list menu is a page to view all diagnostic data that has been filled in on the diagnosis form. Below is a display of all diagnostic data.

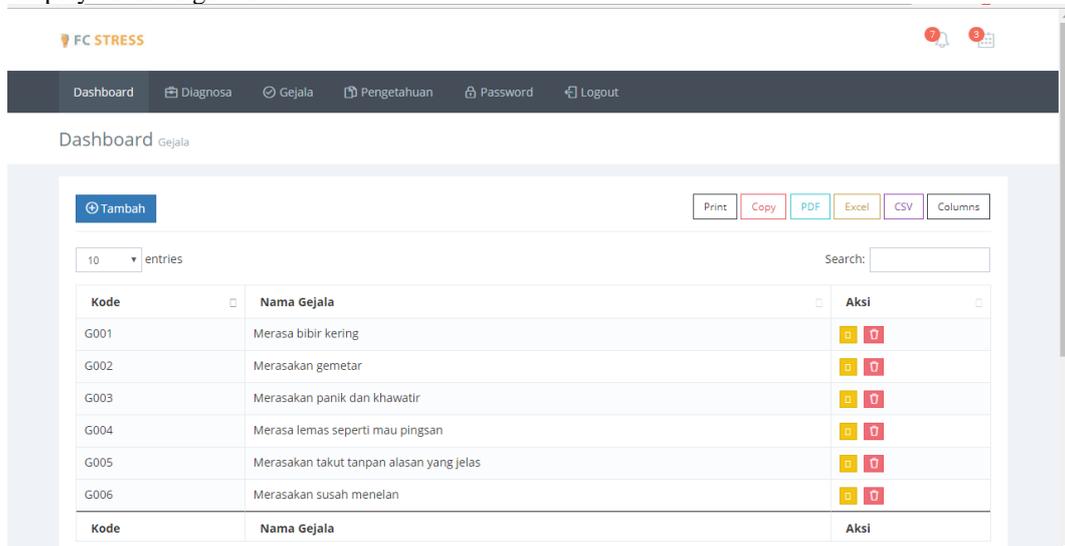


Fig.8. Diagnostic List

The symptom data list menu is a page to see all symptom data. Below is a display of all symptom data.

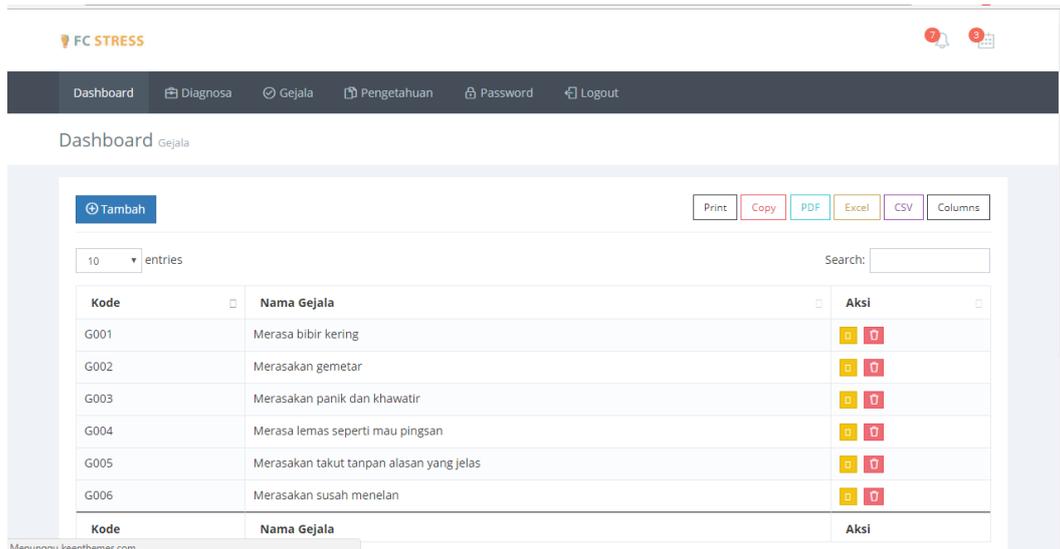


Fig.9. Criteria Data

The knowledge list menu is a page to view all data lists of knowledge or settings from rule conditions based on filled data from diagnoses and symptoms. Below is a display of all knowledge list data.

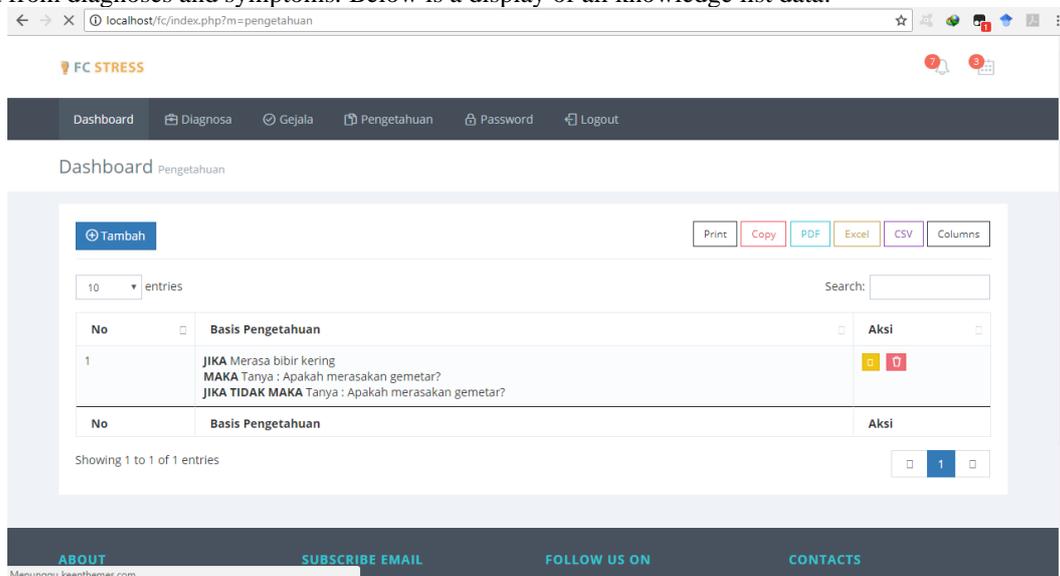


Fig.10. Knowledge List / Rule Report

The consultation form menu is dynamic data where the data is the filling of the student consultation with the use of this system. The form contains information on questions about rules that have been arranged with various symptoms and diagnoses which will later produce information that contains choices from students later.

The screenshot shows a web interface for 'FC STRESS'. At the top, there is a navigation bar with links: Dashboard, Konsultasi, Informasi Aplikasi, Profile, Hubungi Kami, and Login. Below the navigation bar, the page title is 'Dashboard Konsultasi'. The main content area is a consultation form with the heading 'Jawablah pertanyaan berikut ini' and the question 'Apakah merasa bibir kering?'. There are two buttons: 'Ya' (Yes) and 'Tidak' (No). The footer contains four sections: 'ABOUT' (Perancangan Sistem Pakar Untuk Mendiagnosa Tingkat Stress Belajar Pada Siswa SMA Dengan Menggunakan Metode FORWARD CHAINING Berbasis Website), 'SUBSCRIBE EMAIL' (with an email input field and a 'SUBMIT' button), 'FOLLOW US ON' (with social media icons for RSS, Facebook, Twitter, Google+, LinkedIn, YouTube, and Vimeo), and 'CONTACTS' (Phone: 082324359121, Developer: CUT RIZKI PUTRI AMALIA).

Fig.11. Consultation Form

These results will contain information about the student's choice of diagnosis and symptoms. In this analysis using the Forward Chaining method so that the analysis in question is the result of filling out the consultation as shown in the following figure.

The screenshot shows the results of a consultation. The page title is 'Dashboard Konsultasi'. The main content area is titled 'Hasil Konsultasi' and contains the text 'Adapun solusinya adalah' and a button labeled 'Konsultasi Lagi'. Below this is a section titled 'Riwayat Pertanyaan' (Question History) with two entries: '1. Apakah merasa bibir kering? Tidak' and '2. Apakah merasakan gemetar? Ya'. The footer is identical to Fig. 11, with sections for 'ABOUT', 'SUBSCRIBE EMAIL', 'FOLLOW US ON', and 'CONTACTS'.

Fig.12. Results of the Forward Chaining Model Assessment

Besides being displayed in list form, tables and reports are also displayed in graphical form to make it easier for application users to easily view information with graphics, as shown in the image below.

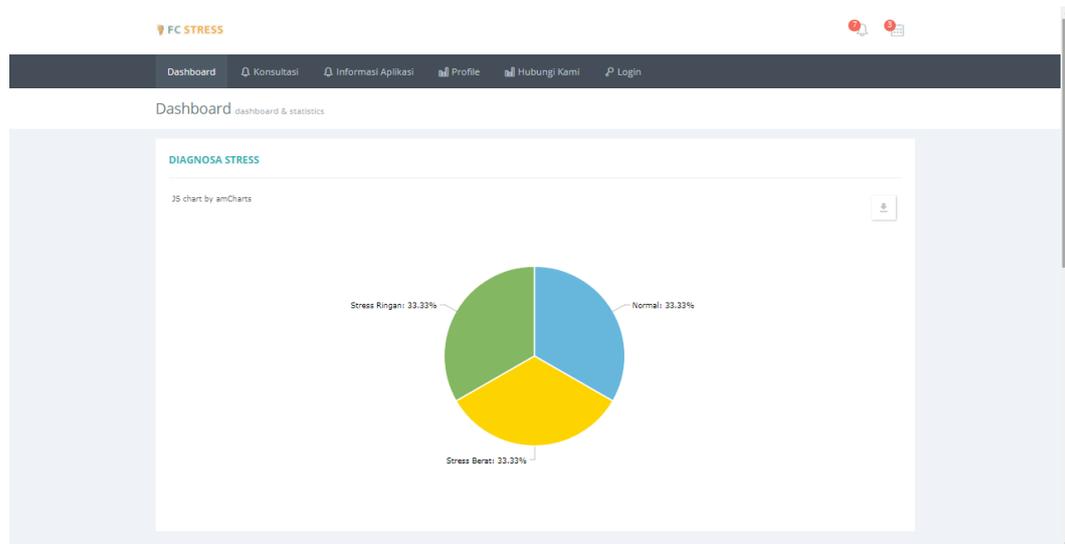


Fig.13. Analysis Result Graph

4. Conclusion

Based on the results of research and testing of expert system design to diagnose the stress level of learning in high school students by using the Website-based Forward Chaining method that has been carried out by the author, several conclusions can be drawn, namely:

1. This study succeeded in making an expert system design to diagnose the stress level of learning in high school students using the Forward Chaining method.
2. This study succeeded in analyzing the results of the calculation of IF THEN ELSE using Forward Chaining.

References

- [1] Akbar, R., and M. Mukhtar. "E-Tracer Study Based on Expert Systems (A Case Study at AMIK Indonesia)." *EPH-International Journal of Science And Engineering* 5.5 (2019): 12-17.
- [2] Mukhtar, Mukhtar, and Ismail Ismail. "Analisis Dampak Technostress terhadap Pembelajaran Praktikum Komputer." *Jurnal JTIC (Jurnal Teknologi Informasi dan Komunikasi)* 3.2 (2019): 75-78.
- [3] Mukhtar, M., and I. Ismail. "The use of Certainty Factor (CF) in Technostress Diagnatation Expert System." *International Journal of Innovative Science and Research Technology (IJISRT)* 4.5 (2019): 727-732.
- [4] Wang, Zhenyuan, Yilu Liu, and Paul J. Griffin. "Neural net and expert system diagnose transformer faults." *IEEE Computer Applications in Power* 13.1 (2000): 50-55.
- [5] Alshawwa, Izzeddin A., et al. "An Expert System for Depression Diagnosis." *International Journal of Academic Health and Medical Research (IJAHMR)* 3.4 (2019).
- [6] Hartati, Ismawati, "Rancang Bangun Sistem Pakar Untuk Mendiagnosis Gangguan Kepribadian Histerik Menggunakan Metode Certainty Factor," vol. 1, pp. 15–23, 2010.
- [7] Giarratano, Filey, "sistem pakar untuk mendiagnosa penyakit tuberkulosis tbc," pengertian Sist. pakar, vol. 12, no. 3, pp. 225–240, 2012.
- [8] A. N. Gumilar, "DIABETES MELLITUS MENGGUNAKAN METODE FORWARD CHAINING," 2016.
- [9] S. Rakasiwi, "SISTEM PAKAR DIAGNOSA PENYAKIT UDANG VANNAMEI MENGGUNAKAN," vol. 8, no. 2, pp. 647–654, 2017.
- [10] Mulyadi, "konsep dasar sistem," konsep dasar Sist., vol. 12, no. 1989, pp. 11–39, 2012.